

Claims

- [c1] What is claimed is:
- 1.A method for using a processor to determine an objective playout quality of a network transmission within a network, said network transmission comprising information in packets for playout according to a playout mechanism, the method comprising:
 - determining a total delay of a packet, said total delay depending on a time of transmission of the packet between two nodes of the network;
 - normalizing the total delay of the packet with respect to a maximum total delay of a group of packets;
 - assigning a delay mean opinion score (DMOS) to the packet based on the normalized total delay of the packet;
 - determining a packet loss rate of the packet, said packet loss rate depending on transmission times of packets transmitted between two nodes of the network being longer than a predetermined time;
 - normalizing the packet loss rate with respect to a maximum packet loss rate of a group of packets;
 - assigning a loss mean opinion score (LMOS) to the packet based on the normalized packet loss rate of the packet;
 - combining the DMOS and the LMOS to determine a mean mean opinion score (MMOS) of the packet; and
 - outputting the MMOS of the packet to a display device.
 - [c2] 2.The method of claim 1 wherein the normalized total delay, the normalized packet loss rate, the DMOS, and the LMOS are determined and assigned referencing continuous modeling equations.
 - [c3] 3.The method of claim 1 wherein the normalized total delay, the normalized packet loss rate, the DMOS, and the LMOS are determined and assigned referencing discrete value lookup tables.
 - [c4] 4.The method of claim 1 wherein the MMOS is an arithmetic mean of the DMOS and the LMOS.
 - [c5] 5.The method of claim 1 further comprising:

averaging MMOS values for a plurality of packets over a time period to determine a time averaged MMOS value for the playout mechanism for the network transmission.

- [c6] 6.The method of claim 5 applied to ranking a plurality of playout mechanisms, the method further comprising:
ranking the plurality of playout mechanisms based on the time averaged MMOS values for each playout mechanism.
- [c7] 7.The method of claim 1 further comprising:
providing a user interface through which a human user can adjust mathematical parameters of the normalization of the total delay of the packet, the assignment of the DMOS to the packet, the normalization of the packet loss rate of the packet, and the assignment of the LMOS to the packet.
- [c8] 8.The method of claim 1 wherein the network transmission is for a voice over Internet protocol (VoIP), videophone, on-line game, or other real-time interactive communication.
- [c9] 9.The method of claim 1 wherein the network is a computer network or a radio transmission network for wireless phones.
- [c10] 10.A method for using a processor to determine an objective playout quality of a network transmission within a network, said network transmission comprising information in packets for playout according to a playout mechanism, the method comprising:
determining a total delay of a packet, said total delay comprising a time of transmission of the packet between two nodes of the network;
calculating a normalized total delay as a ratio of the total delay for the packet to a maximum total delay, said ratio raised to a power of a delay factor;
calculating a delay mean opinion score (DMOS) of the packet as one minus the normalized total delay, said result being raised to a power of a DMOS factor, and said further result being multiplied by a maximum mean opinion score (MOS); and
outputting the DMOS of the packet to a display device.

- [c11] 11.The method of claim 10 wherein the delay factor and the DMOS factor are experimentally determined constants.
- [c12] 12.The method of claim 10 wherein the maximum MOS is a maximum value that is set according to the playout mechanism.
- [c13] 13.A method for using a processor to determine an objective playout quality of a network transmission within a network, said network transmission comprising information in packets for playout according to a playout mechanism, the method comprising:
 determining a packet loss rate of a packet, said packet loss rate comprising a rate that a transmission time of packets transmitted between the two nodes is longer than a predetermined time;
 calculating a normalized packet loss rate as a ratio of the packet loss rate for the packet to a maximum packet loss rate, said ratio raised to a power of a loss factor;
 calculating a loss mean opinion score (LMOS) of the packet as one minus the normalized packet loss rate, said result being raised to a power of an LMOS factor, and said further result being multiplied by a maximum mean opinion score (MOS); and
 outputting the LMOS of the packet to a display device.
- [c14] 14.The method of claim 13 wherein the loss factor and the LMOS factor are experimentally determined constants.
- [c15] 15.The method of claim 13 wherein the maximum MOS is a maximum value that is set according to the playout mechanism.